VETERANS HEALTH ADMINISTRATION
OFFICE OF PATIENT CARE SERVICES
TECHNOLOGY ASSESSMENT PROGRAM

Brief Overview:

Mandatory Training—A Systematic Review of Research and Trends in Learning Organizations

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TECHNOLOGY ASSESSMENT PROGRAM

An Effective Resource for Evidence-based Managers

VA's Technology Assessment Program (VATAP) is a national program within the Office of Patient Care Services dedicated to advancing evidence-based decision making in VA. VATAP responds to the information needs of senior VA policy makers by carrying out systematic reviews of the medical literature on health care technologies to determine "what works" in health care. "Technologies" may be devices, drugs, procedures, and organizational and supportive systems used in health care. VATAP reports can be used to support better resource management.

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- The ***Short report*** is a self-contained, rapidly-produced qualitative systematic review of between 5 and 20 pages. It provides sufficient background information and clinical context to its subject technology to be accessible to a wide audience, including non-clinician managers.
- The ***Brief overview*** originated as an internal memo to VA clients with both well-defined and urgent information needs. It usually comprises 2 to 10 pages and assumes sufficient existing knowledge regarding clinical context and technology issues by its readers to omit these components of other VATAP products. It often requires some additional reading of documents (provided with the overview for the client) to obtain a full and comprehensive picture of the state of knowledge on the topic.

All VATAP products are reviewed internally by VATAP's physician advisor and key experts in VA. Additional comments and information on this report can be sent to:

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A SUMMARY FOR HTA REPORTS

VATAP is a member of the International Network of Agencies for Health Technology Assessment (INAHTA) [www.inahta.org]. INAHTA developed this checklist© as a quality assurance guide to foster consistency and transparency in the health technology assessment (HTA) process. VATAP had added this checklist© to its reports produced since 2002.

This summary form is intended as an aid for those who want to record the extent to which a HTA report meets the 17 questions presented in the checklist. It is NOT intended as a scorecard to rate the standard of HTA reports – reports may be valid and useful without meeting all of the criteria that have been listed.

BRIEF OVERVIEW
Mandatory Learning—A Systematic Review of Research and Trends in Learning Organizations
March 2010

Item	Yes	Partly	No
Preliminary			
1. Appropriate contact details for further information?	√		
2. Authors identified?	√		
3. Statement regarding conflict of interest?			√
4. Statement on whether report externally reviewed?	√		
5. Short summary in non-technical language?	√	√	
Why?			
6. Reference to the question that is addressed and context of the assessment?	√		
7. Scope of the assessment specified?	√		
8. Description of the health technology?		√	
How?			
9. Details on sources of information?	√		
10. Information on selection of material for assessment?	√		
11. Information on basis for interpretation of selected data?	√		
What?			
12. Results of assessment clearly presented?	√		
13. Interpretation of the assessment results included?	√		
What Then?			
14. Findings of the assessment discussed?	√		
15. Medico-legal implications considered?		√	
16. Conclusions from assessment clearly stated?	√		
17. Suggestions for further actions?	√		

CONTRIBUTORS TO THIS REVIEW

[*]VATAP projects draw on expertise within VA nationally; physical locations provide contact guidance for contributors.

[†]No contributors to this review report conflicts of interest.

VATAP staff person/position	Role	Tasks
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Elizabeth Adams Health System Specialist Boston	Primary author	Conception and conduct of review: • Communication with client; • Interim information; • Analytic framework; • Draft review; • Final review.
Elaine Alligood Information Specialist Boston	Literature database searches	Database searches: • Design strategy; • Choose/manage databases; • Strategy text and bibliography for report; • VATAP library/archive of information resources.
Bernard Spence Administrative Officer Boston	Administrative support	• Budget/resources; • Project tracking.
Sarah Curran Library Technician Boston	Article retrieval	Information retrieval: • Full text from print journals and electronic resources; • Manage reference lists.
Valerie Lawrence Physician Advisor San Antonio	Content and methods review	Final review: • Internal consistency, • Clarity; • Clinical context; • Methods.

BRIEF OVERVIEW:
Mandatory Training—A Systematic Review of Research and Trends in Learning Organizations

POLICY ISSUE

Veterans Health Administration (VHA) is dedicated to the concept of being an organization that learns continuously as a means of achieving desired organizational outcomes and performance. As such, VHA must ensure the competence of its employees and invests heavily in training to meet these objectives. Nationally mandated training is now managed by the VHA Employee Education System (EES) for all employees except for trainees, whose orientation and training needs are managed by the Office of Academic Affiliations (Department of Veterans Affairs VHA, 2007).

The VHA training program has been criticized by some employees for having excessive, redundant or unnecessary training requirements (VHA, 2007). These requirements place a particular burden on clinical staff who must take time from patient care to meet them, in addition to their individual professional requirements. As a result, mandatory training has become a barrier to the recruitment and retention of full- and part-time clinical staff, other part-time employees, Without Compensation (WOC) employees and trainees, to the detriment of patient care.

The Human Resource Committee of the VHA National Leadership Board chartered a workgroup to develop a strategic, evidence-based approach to mandatory training that links employee learning to defined organizational outcomes. The workgroup is charged with developing criteria to determine when an organizational need requires mandatory training or other alternatives, in order to maximize individual learning and organizational outcomes. The rationale behind the workgroup's efforts is that mandatory training, used sparingly, will become meaningful, focused, effective, flexible and satisfying to employees.

> ***There is a growing preference for using the term "learning" rather than "training" to convey the knowledge gained by the learner through the learning experience. This replaces a previous "one-way push" training model that emphasized the transference of knowledge from trainer to trainee. Following this trend, this report will substitute the term "learning" for "training", where applicable.***

In January 2009, the Veterans Affairs Technology Assessment Program (TAP) was tasked with assisting the workgroup in developing evidence-based recommendations to address the following research questions:

Primary research question: ***What is the relative effectiveness of mandatory learning or training vs. other strategies to improve organizational performance in a health care or non-health care setting?***

Secondary questions:

1. ***Does the modality of learning matter?*** VHA uses a wide variety of formats for education, including national face-to-face meetings, regional conferences, live teleconferences, e-mailings, and web-based tutorials with quizzes.

2. ***What can VHA learn from other organizations?***

- Specifically, what is the role of mandatory training in organizations that define themselves as 'learning organizations'?
- What are the current trends at leading organizations regarding the use of mandatory training in relation to other avenues for organizational improvement?

This review addresses mandatory learning strategies targeted to a broad base of employees in the work force. It does not address the vast research of mandated education strategies targeted to specific clinical providers for licensing requirements, like continuing medical education (CME), or for changing provider behavior and improving patient outcomes, such as clinical practice guidelines. TAP already produced two reports pertaining to those issues:

- Interventions to Change Clinical Behavior to Improve Patient Outcomes (Flynn, 2007).
- Systematic Reviews for Patient Centered Care (Flynn, 2007).

BACKGROUND

Several theoretical constructs lay the foundation for current trends and motivations in the field of employee training. They are too numerous to cover and are not the focus of this review, but some of the theories and terminology relevant to mandatory learning are presented below, to assist an uninitiated reader in better understanding the topic.

From an organizational development perspective, **learning** is a characteristic of an organization that is able to adapt to changes in its internal and external environment, in order to improve performance and competitiveness. **Organizational learning** (OL) is an area of knowledge within organizational theory (systems thinking) that studies models and theories from a variety of social science disciplines regarding the way an organization learns and adapts through the interaction of its individuals. The theoretical models of OL were founded primarily on the modern-day work of Argyris and Schön (1978), on which others have built.

A **learning organization** applies the theoretical findings of OL to create an organization that continuously and effectively learns in order to adapt to a changing environment. To find solutions to an organizational issue, a learning organization must first capture individual knowledge and experience, transfer that knowledge to others in an understandable and meaningful way, and integrate knowledge from various sources. A learning organization has five main disciplines: personal mastery; mental models; shared vision; team learning; and systems thinking (Senge, 1990). These disciplines are necessary to foster a culture of open communication, trust and individual engagement, which in turn can lead to improved organizational performance and a competitive advantage.

A learning organization is built on many theoretical frameworks. These frameworks have been applied across industries, including health care, in which decision makers try to effect adoption

of evidence-based medicine (EBM) practices. A recent literature review identified seven learning organization frameworks particularly relevant to EBM organizations (Crites, 2009). They are: Organizational Learning; Decision-Execution Cycles; Organizational Knowledge Creation; Organizational Culture; Complex Adaptive Systems; Diffusion and Dissemination of Innovation; and Total Quality Management.

According to modern **adult learning theory**, the adult learner is more self-directed, has a range of real-life experiences upon which to draw, and is internally motivated to learn subject matter that is relevant and can be applied immediately to his or her job or life (Knowles, 1975). Most learning is embedded in the work done and happens informally, while less than 15% reportedly occurs through formal processes (Veterans Health Administration Learning Xchange Group, 2001).

Forced learning theory asserts that "forced" engagement must precede true self-directedness. In other words, when the adult learner is forced to participate in a learning program, only then can his or her self-directed learning be realized. On the other hand, forced or "mandated" learning has been criticized for working against the principles of a learning organization, decreasing an individual's motivation to learn, and being perceived as too controlling.

Therefore, if the adult learner must engage in the learning process for self-directedness to occur, then the learning programs are challenged to entice the adult learner for outcomes to be realized.

> *"We're hard-wired to pay attention and pursue things we're attracted to. This isn't about selling them on an idea--it's about helping them stay engaged and learning. Knowing what--and when--to withhold is one of the most powerful tools you have…And don't even think about suggesting that "page-turner" doesn't apply to, say, technical material. If the purpose is learning, the learner has to stay engaged* (Sierra, 2010).

EVALUATION OF LEARNING PROGRAMS

In "Eleven Reasons Why Training Fails" Phillips and Phillips (2005) stated that training or learning programs must be aligned or connected to a business measure for that program to be linked to the desired performance improvement. Holton (1996) further argues:

> *"…for results to occur, the intervention must be linked with organizational goals (ability), have utility or payoff to the organization and individual (motivation), and be subject to influences of factors outside HRD* [human resources development] *(environment)."*

A four-level typology developed by Kirkpatrick (1978) is commonly used to link initial learning needs to organizational needs and evaluation. A learning program's four levels of outcome are classified as: 1) learner reaction; 2) acquirement of learning; 3) behavioral change, and; 4) changes to the organization. Outcomes above Level 1 (learner reaction) apply skills and tacit or explicit knowledge that a learner acquires from a variety of sources, including a training program. Higher level outcomes should ideally incorporate intangibles that enhance a person's contribution to an organization (e.g. replacement value, teamwork or customer satisfaction) (Abernathy, 1999).

Kirkpatrick's model has been modified over time to address specific results of economic benefit to the organization and societal values. Integrative evaluation models have also evolved from this model that attempt to account for the complex interactions between individuals, context

and organizational results (Holton, 1996; Phillips, 1996). However, criticisms of existing evaluation models are that they have been inadequately researched and are rarely implemented fully to allow for more complete study.

While imperfect, the Kirkpatrick model continues to be the evaluation framework most ensconced in the OL literature. It will be used in this review as a means of organizing and identifying the evidence for evaluating existing research that explores the link between the learning mechanism and organizational improvement.

METHODS

VATAP conducted extensive searches of the published research literature and applied inclusion criteria as a filter for selecting the best evidence from published research for addressing the questions in this review. The included primary studies were critically appraised by applying scientific rules of evidence to help interpret the persuasiveness of the evidence for linking cause to effect based primarily on the type and quality of the research design. Ultimately, the conclusions should follow logically from the evidence appraised in the review, and the recommendations for policy should be linked to the strength (or quality) of the evidence.

TAP approached this review by first focusing on available systematic reviews, then updating these systematic reviews with relevant primary studies not included in the initial reviews.

Systematic reviews

A systematic review applies explicit, reproducible methods that emphasize study quality and minimize potential bias in addressing a focused question, usually about a particular intervention (Mulrow, 1997). In contrast, a traditional narrative review frequently addresses a broad topic and fails to report objectives or identify articles and methods for critical appraisal. Additionally, they may be susceptible to bias in the selection, analysis, and synthesis of studies, and may ignore methodological weaknesses in primary studies, leading to erroneous conclusions. For this reason, narrative reviews were not included in this report.

Systematic reviews can be quantitative (e.g. meta-analytic) where primary studies permit, or qualitative. Systematic review production requires a minimum threshold level of available primary research tailored to the review question. Therefore, presence or absence of published systematic reviews provides an immediate signal of the general status of a body of research literature.

Searching and retrieval

From January 2009 to February 2010, VATAP conducted extensive searches of the published research literature across the business, education, health care, social sciences, and biomedical domains covering the years 1990 to the present. In addition to the Cochrane Library and focused Internet searches in education, a total of 17 Dialog® Information Services databases were searched: MEDLINE, EMBASE, PsycINFO, ERIC, EMCARE, Social SciSearch, Bus & Mgmt: BAMP, ABI/Inform, Mgmt Contents, Gale Bus ARTS, Gale Trade & Industry, ProQuest Periodical Abs, Wilson Bus Abs, Wall Street Journal, Business Week, Harvard Business Review, and PAIS.

Given the breadth of the topic and its role in virtually all endeavors and careers, search terminology included terms, phrases and concepts from all subject domains. This resulted in

multiple strategies and searches to ensure comprehensive and meticulous retrieval (Appendix 1, p. 11). Appendix 1 illustrates an example of the search terms and partial search strategies used in this report.

Inclusion/Exclusion criteria

Initially, TAP included primary studies, systematic reviews and meta-analyses that met the following criteria:

- Subjects are adults in the workforce;
- Mandated or forced learning intervention is compared with another educational or non-educational intervention to determine relative effectiveness;
- Study designs are either experimental or quasi-experimental;
- Outcomes measure organizational results (Kirkpatrick Level 4);
- Full text available;
- Published in English.

Excluded from review were:

- Children or students of any age, including higher education or post-graduate level, as subjects;
- Traditional CME interventions;
- Clinical outcomes, unless reported at an organizational level as a proxy for organizational performance, or individual clinical behaviors;
- Pre-post design or other design without a separate comparator group;
- Articles lacking a clear description of objectives, methods, or results.

After initial scoping searches uncovered no experimental or quasi-experimental studies, TAP expanded its criteria to include studies that used a pre-post design and qualitative methods to investigate the value of mandated approaches to organizational learning and performance.

RESULTS

TAP's searches captured a total of 3,256 citations. After review of title and abstract information, the full texts of 135 citations were retrieved for further consideration. Of those, four articles met the criteria for inclusion in this report (See Appendix 2).

Systematic reviews

The searches identified no systematic reviews that addressed specifically the relative effectiveness of mandatory or forced learning versus another comparator. TAP identified three systematic reviews: one meta-analytic (Arthur, 2003), and two qualitative (Rashman, 2009; Greenhalgh, 2004)). Arthur (2003) and Rashman (2009) assessed the effectiveness of OL or training, and Greenhalgh (2004) reviewed the literature on the diffusion of innovation in health service delivery and organization.

Greenhalgh (2004) defined innovation as:

> *"…a novel set of behaviours, routines and ways of working, which are directed at improving outcomes, administrative efficiency, cost-effectiveness, or the user experience, and which are implemented by means of planned and co-ordinated action. The mechanisms by which innovations spread include both diffusion (a passive phenomenon of adoption by individuals and organizations) and dissemination (the active attempt to influence the rate and success of adoption)."*

In the context of this report, mandated learning and, conversely, self-directed learning could be considered mechanisms by which an organization spreads innovation.

These reviews add value to the discussion by synthesizing large, comprehensive and often contradictory literature that encompass a range of academic disciplines, from which one could extract trends, knowledge gaps and research recommendations for the study and implementation of learning strategies. The findings most relevant to mandatory learning are abstracted and presented in Appendix 2.

Common themes from the organizational learning (OL) literature emerged:

- The popularity of OL has risen in the last twenty years as evidenced by the growth in publications of emerging theories, case studies and review articles. In reviews of the OL literature, often the number of times an article was cited by others served as proof of the strength of the evidence and acceptance of an original theory. However, few of the original theories have been verified empirically using designs with acceptable internal or external validity.
- The evidence base consists primarily of case studies or studies using a pre-post design. Few controlled studies were identified. Multiple learning strategies were used in each study arm, thus preventing determination of the effects of any one isolate intervention.
- Heterogeneity and inadequate description of all aspects of study design further limited interpretation and generalizability of the results.
- The evidence base is strongest for a connection between knowledge and behavior, but the connection between acquiring knowledge and desired organizational outcomes is far less substantiated and considerably more challenging to research. Missing from the evidence base was an explanation of why these relationships exist and under what conditions.

- In the context of mandated learning in public sector organizations, the influence of political scrutiny and policy directives can both enhance and undermine OL efforts. External mandates (particularly if accompanied with dedicated funding) can provide the motivation to learn and increase their acceptance and chances of success. However, failure to learn may occur if an organization lacks the readiness (capacity) to adopt learning processes and embrace their associated results. Several factors may constrain learning in a public sector organization:
    - Both formal and informal politics within the organization;
    - Failure to time the introduction of a learning solution within a policymaking cycle;
    - A risk-averse culture that does not allow for learning from failure;
    - Externally imposed performance targets;
    - Reliance on outcome measures of explicit forms of knowledge, rather than on those that consider sharing of tacit knowledge between individuals;
    - Fast pace of change;
    - Failure to allow for the time or opportunity needed to develop such learning processes;
    - A learning solution that is not technically feasible or congruent with prevailing values.

Primary studies

TAP identified one study from the management sciences that met inclusion criteria (Appendix 2). Haunschild and Rhee (2004) studied the role of volition in organizational learning for automakers learning from 1) voluntary product recalls initiated by the automaker, or 2) mandated recalls by the National Highway Transportation and Safety Administration (NHTSA). Organizational learning outcomes were measured in terms of subsequent mandated recall rates. They found that voluntary recalls resulted in greater learning (i.e. a reduction in subsequent mandated recall rates) than mandated recalls, and that learning from voluntary recalls may be more deeply rooted in the organization. Differences among employees, expressed as generalists and specialists, were also noted: generalists learned better from voluntary recalls than specialists.

CONCLUSIONS

- **What is the relative effectiveness of mandatory learning or training vs. other strategies to improve organizational performance in a health care or non-health care setting?**

The evidence for the effectiveness of mandated learning strategies is limited to one primary study from the automobile industry (Haunschild and Rhee, 2004). Their results suggest volition may be an important and understudied determinant of the rate and effectiveness of organizational learning:

> *"In effect, our results show that institutionally mandated change is not as effective as voluntary change if the measure of effectiveness is the organization's ability to reduce subsequent violations of institutional rules. This may be the result of symbolic adaptation to mandated change. Thus, while automakers are conforming to the letter of the law in these cases, they may not be conforming to its spirit—using the experience as a tool from which to learn to prevent recalls in the future."*

TAP's limited findings are not surprising, given that reviews of the broader topic areas of OL and the diffusion of innovation confirmed the scant available information on the effectiveness of OL measured at the organizational level. Evidence of the effects of OL is comprised largely of theoretical constructs developed by the authors' own experiences, lacking validation from empirical findings.

In the included qualitative systematic reviews (Rashman, 2009; Greenhalgh, 2004), mandates were discussed in terms of power, political influences or policy directives. Some suggest that mandated learning helps provide the incentive to overcome organizational inertia, while others suggest that mandates produce defensive reactions. The effect of external mandates was highlighted as an understudied area. Specifically, areas of research that would enhance the body of OL literature are the relationship between organizational response to external mandates, and understanding how and when organizations learn from failure.

A review by Tharenou (2007) on training and organizational outcomes confirms these findings (inadequate description of methods and no specific exploration of mandates prevented inclusion in this TAP review). While they found a positive correlation between training and organizational effectiveness in the limited body of literature, there was inconsistency in study design, conduct, outcome measures and analysis used. Research into the mediating factors was inadequate and future research was needed to address this.

The American Society for Training & Development (ASTD) produced a series of Learning Outcomes reports by Deborah Grafinger Hacker published in 2001 and 2002 that evaluated education and training investments using their Benchmarking Service's *Measurement Kit*™. This evaluation was done for more than 550 organizations from 42 countries. The effects of mandatory versus voluntary courses on learning outcomes (at Kirkpatrick Level 3) were included (see Table 1 below). Incomplete methods description and mixed statistical presentation prevented inclusion of their findings in this TAP review.

Table 1. Mandatory versus Voluntary Courses on Learning Outcomes
Source: ASTD Learning Outcomes reports 2001, 2002 **www.astd.org**

Year	% Change in overall course objectives		% Change in overall job performance	
	Voluntary	Mandatory	Voluntary	Mandatory
2001	34.5% (Mean)	33.7% (Mean)	30.0% (Mean)	30.4% (Mean)
2002	34% (Ave)	37% (Ave)	30% (Ave)	33% (Ave)

The results suggest that learners benefitted from both types of courses, but the reported benefits were conflicting for one type over another. ASTD reported no statistically significant differences between voluntary and mandatory learning in 2001, whereas the differences were statistically significant in 2002. What may account for these differences is unclear due to lack of transparency in methods used to collate and analyze the data. For example, differences in the reported measure of central tendency (mean vs. average % change) may account for some of the variation.

- **Does the modality of learning matter?**

Results of the meta-analysis (Arthur 2003) found that training effectiveness varies as a function of evaluation criteria (eg. Kirkpatrick levels), training delivery method, what is being learned,

and the criterion used to operationalize effectiveness. In addition to calls for improved study design, research is needed to improve measurement and understanding of what is learned, how it is learned and under what optimal conditions. These areas have received insufficient attention in the OL research.

- **What can we learn from other organizations? Specifically, what is the role of mandatory training in organizations that define themselves as 'learning organizations'? What are the current trends at leading organizations regarding the use of mandatory education in relation to other avenues for organizational improvement?**

As none of the systematic reviews explicitly addressed mandatory training/learning as a mechanism for improving organizational performance, no definitive conclusions regarding the role of mandatory training in key learning organizations can be drawn.

It would seem reasonable that VHA as a public sector organization could benefit from the learning experiences of the private sector. At the same time, VHA should view these experiences cautiously. Public sector learning organizations present unique characteristics from those of the private sector. Most notable is the wider range of external influences (eg. the role of elected politicians and government policy, government and non-governmental partnerships, and stakeholder engagement) on public organizations that serve as motivation for meeting organizational performance goals, rather than attaining a competitive edge, *per se*. How these characteristics affect the generalizability of outcomes associated with organizational learning across private and public organizations has not been determined.

As Rashman (2008) notes:

> *"In contrast with the systematic review of innovation [Greenhalgh 2004], there is still limited recognition in the literature of the impact of context on the levels, processes and influential factors in relation to organizational and inter-organizational learning and knowledge. We suggest that there is a gap in the literature because much literature is based on the implicit assumption of a private sector context and that gives insufficient attention to the interaction of context with other determinants of organizational learning. In particular, we suggest that there is a need for robust theory that takes into account the complex nature of public service organizations' institutional, governance, structural and public value context…*
>
> *…There is a relative paucity of literature that develops an understanding of organizational learning in public service organizations and few research results that indicate how organizational learning and knowledge in public sector organizations differ from organizational learning and knowledge in private sector organizations."*

DISCUSSION

Phillips and Phillips (2009) found the most common reason for why training/learning fails was because the wrong solution was identified for the particular issue:

> *"Executives often request a learning solution when they see a problem. If something is not working in the organization, those executives assume employees don't have the knowledge or skills. Research continues to show that when there's a dysfunctional or ineffective process, the most appropriate solution is a non-learning solution."*

Arthur (2003) found that needs assessment was underreported in the extant literature, despite assertions from academicians that they are performed frequently in organizations. Therefore, a logical first step for a learning organization would be to identify the core problem or need, and match it with the best possible solution. Whether that solution should be mandated learning or another solution cannot be determined from the evidence in this review.

Finally, there are important lessons to be learned and recommendations for future research from the two qualitative systematic reviews (Greenhalgh, 2004; Rashman, 2009) with regard to approaches for studying, synthesizing and interpreting evidence from a diverse and expansive literature base such as OL. These lessons may be helpful to a learning organization trying to develop and implement effective evidence-based learning strategies:

- Research should use the best method(s) designed to provide the most useful and valid answer(s) (Sackett and Wennberg, 1997). While there are calls for higher quality studies of effectiveness, experimental and quasi-experimental studies often control for the very factors (context and confounders) that are essential to understanding the diffusion, dissemination and implementation of complex learning strategies. Future research should be undertaken to better understand the effects of training on organizational-level outcome. Mixed methodology that includes interpretive approaches may be needed to create a more complete picture of process and impact in complex organizations.
- Future research is needed to better understand organizational response to external mandates, and how and when organizations learn from failure.
- Future research on knowledge transfer should consider the distinction between tacit and explicit knowledge in understanding how knowledge is transferred.
- Future research and policymakers should take into account the time, opportunities and supportive conditions for the development and study of learning between individuals and groups. Factors that motivate employees' engagement in self-directed learning are not well understood.
- Future research is needed on the similarities and differences between private and public sector learning organizations to understand what lessons can be applied inter-organizationally.
- Applying classical evidence-based medicine systematic review methodology to literature in the social sciences and management sciences may require modification in situations where perspectives, concepts, theories, definitions and interpretations vary widely. Both qualitative systematic reviews in this report employed a combination of transparent and replicable methods found in traditional systematic review methodology, as well as narrative techniques for identifying and tracing theoretical development and empirical work across a range of research traditions over time. Rashman (2009) referred to their narrative approach as "conceptual synthesis" and Greenhalgh (2004) referred to theirs as "meta-narrative mapping." These authors argued that blending both traditional and narrative synthesis techniques was necessary for identifying and synthesizing such diverse and complex subject matter as OL.

APPENDIX 1. Abbreviated Mandatory Training Search Strategies

Databases Searched: Cochrane Library and Dialog Information Services Files: MEDLINE, EMBASE, PsycINFO, ERIC, EMCARE, SciSearch, Bus & Mgmt: BAMP, ABI/Inform, Mgmt Contents, Gale Bus ARTS, Gale Trade & Industry, ProQuest Periodical Abs, Wilson Bus Abs, Wall Street Journal, Business Week, Harvard Business Review, PAIS

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MANDTRAINING1
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MANDATORYPSYCHABS
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STUDY OR STUDIES OR OUTCOME? OR REVIEW? OR META()ANALY? OR METAANALY?)/TI
S S3 NOT (SCHOOL LEARNING/DE OR ANIMAL/DE OR RATS/DE OR SECONDARY EDUCATION/DE)
S S4 NOT (COLLEGE STUDENTS/DE OR HOMEWORK/DE OR PARENTS/DE)
S S5 AND PY=2000:2009
S S6 NOT (SPECIAL EDUCATION STUDENTS/DE OR SPECIAL()NEEDS/TI,ID)
S S7 AND SH=(PROFESSIONAL EDUCATION & TRAINING  OR PROFESSIONAL PERSONNEL ATTITUDES &
CHARACTERISTICS OR MANAGEMENT & MANAGEMENT TRAINING OR  PROFESSIONAL EDUCATION & TRAINING)
S (ORGANIZATIONAL EFFECTIVENESS OR EVIDENCE BASED PRACTICE OR ORGANIZATIONAL LEARNING OR
ORGANIZATIONAL DEVELOPMENT)/DE
S ME='CLINICAL CASE STUDY':ME='TREATMENT OUTCOME/CLINICAL TRIAL'
S ME=SYSTEMATIC REVIEW  OR  ME=META ANALYSIS  OR  ME=LITERATURE REVIEW
S S8 AND (S19 OR EVIDENCE/TI OR ANALY?/TI OR SYSTEMATIC/TI OR REVIEW/TI OR INVESTIGAT?/TI OR
STUDY/TI)
S CORPORATE()WIDE()TRAINING/TI
S (MANAGEMENT TRAINING/DE  OR  PERSONNEL TRAINING/DE  OR SH=MANAGEMENT & MANAGEMENT TRAINING)
S INVESTIGATION/TI AND EFFECT/TI AND ECONOMIC/TI AND UTILITY/TI AND TRAINING/TI
S S EFFECT/TI AND ECONOMIC/TI AND UTILITY/TI AND TRAINING/TI
S EFFECT/TI AND ECONOMIC/TI AND TRAINING/TI
S (EFFECTIVENESS AND TRAINING AND ORGANIZATIONS)/TI
S SKILL?()(DECAY? OR RETENTION OR RETAIN?)/TI
S SKILL?(N)(DECAY? OR RETENTION OR RETAIN? OR TRAIN? OR RELEARN? OR LEARN?)/TI
S ME='EMPIRICAL STUDY' OR ME='FIELD STUDY' OR ME='FOLLOWUP STUDY' OR ME='LITERATURE REVIEW' OR
       ME='LONGITUDINAL STUDY' OR ME='META ANALYSIS':ME='SYSTEMATIC REVIEW'
S S48 NOT (CHILD OR CHILDREN OR STUDENT? OR ADOLESCENT? OR AUTISM OR REHABILITAT? OR SOCIAL OR
SCHIZOPHRENIC)/TI,DE
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S S50 AND (OUTCOME? OR EFFECTIVE? OR EFFECTIVENESS OR REVIEW OR ASSESSMENT OR EVIDENCE OR
INVESTIGAT? OR META()ANALY? OR METAANALY? OR STUDY OR UTILITY OR FACTORS OR META()SYNTHES? OR
SYSTEMATIC? OR EVALUAT? )/TI

MANDATORYEMCARE
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S CONTIN?(1N)EDUCAT?/TI OR SKILL? ?(N)DEVELOP?/TI OR LEARNING?/TI OR
ORGANIZATIONAL(1N)LEARNING)/TI OR (EMPLOYEE? OR ADULT? OR WORKPLACE OR OFFICE? OR CORPORATE OR
ENTERPRISE OR ORGANIZATION?)/TI(2N)(DEVELOPMENT OR TRAINING OR LEARNING OR EDUCAT? OR TEACHING
OR LEARN?)/TI
S (CONTINU?(N)EDUCATION/TI OR ADULT?(N)EDUCAT?/TI OR PROFESSION?(N)DEVELOPMENT?/TI OR
DISTANCE(N)EDUCAT?/TI OR ADULT(N)LEARN?/TI OR INSERVICE(N)TRAIN?/TI OR PERSONNEL(N)TRAIN?/TI OR
SELF(N)INSTRUCT?(N)TRAIN?/TI OR CAREER(N)DEVELOP?/TI OR CAREER?(N)EDUCAT?/TI)
S (S1 OR S2) AND (EVALUAT? OR SYSTEMATIC OR UTILI? OR INVESTIGAT? OR EFFECTIV? OR ASSESS? OR
STUDY OR STUDIES OR OUTCOME? OR REVIEW? OR META()ANALY? OR METAANALY?)/TI
S S3 AND PY=2000:2010
S S4 AND (EVALUAT? OR SYSTEMATIC OR UTILI? OR INVESTIGAT? OR EFFECTIV? OR ASSESS? OR STUDY OR
OUTCOME? OR META()ANALY? OR METAANALY?)/TI
S S4 NOT (OCCUPATIONAL()THERAP? OR REHABILITAT? OR SOCIAL()SUPPORT OR VOCATION OR
DISABIL?)/TI,DE
S S6 AND (SYSTEMATIC()REVIEW? OR META()ANALY? OR OUTCOME? OR EFFECTIVE?)/TI

MANDATORYTRAINING2
------------------
S CONTIN?()EDUCAT?/TI OR SKILL? ?() DEVELOP?/TI OR WORK?()TRAINING?/TI
S(EMPLOYEE? OR WORKPLACE OR CORPORATE OR ENTERPRISE OR STAFF OR ORGANIZATION?)/TI(N)(DEVELOP? OR
    TRAIN? OR EDUCAT? OR TEACHING)/TI
S CONTINU?()EDUCATION/TI OR PROFESSION?()DEVELOPMENT?/TI OR DISTANCE()EDUCAT?/TI OR
ADULT()LEARN?/TI OR
    INSERVICE()TRAIN?/TI OR PERSONNEL()TRAIN?/TI  OR SELF()INSTRUCT?()TRAIN?/TI OR
DISTANCE()LEARNING/TI
S (S1 OR S2 OR S3) AND (EVALUAT? OR SYSTEMATIC OR INVESTIGAT? OR EFFECTIV? OR ASSESS? OR STUDY
OR
    STUDIES OR CRITICAL? OR OUTCOME? OR REVIEW? OR META()ANALY? OR METAANALY?)/TI

MANDEDUCLAST
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S (CONTIN?(1N)EDUCAT?/TI) OR (SKILL? ?(N)DEVELOP?/TI)
S LEARNING?/TI OR (ORGANIZATIONAL(1N)LEARNING)/TI OR (VOLUNTARY OR VOLITION?)/TI(N)(LEARNING OR
TRAINING OR EDUCATION?)/TI
S (EMPLOYEE? OR ADULT? OR WORKPLACE OR OFFICE? OR CORPORATE OR ENTERPRISE OR
ORGANIZATION?)/TI(N)(TRAINING OR LEARNING OR EDUCAT? OR TEACHING)/TI
S(LEARNING(N)INTERVENTION?)/TI OR CME/TI OR (INTERPROFESSIONAL?(N)(EDUCATION? OR TRAIN? OR
INSTRUCT?)/TI)
S INTERPROFESSIONAL?(N)(EDUCATION?/TI OR TRAIN?/TI OR SKILL?()DEVELOP?/TI)
S PROFESSION?(N)DEVELOPMENT?/TI OR DISTANCE(N)EDUCAT?/TI OR ADULT(N)LEARN?/TI OR
INSERVICE(N)TRAIN?/TI
S PERSONNEL(N)TRAIN?/TI OR SELF/TI(N)(INSTRUCT? OR TRAIN?)/TI OR CAREER(N)DEVELOP?/TI OR
CAREER?(N)EDUCAT?/TI
S S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7
S S8 AND (REQUIRED OR VOLITION? OR VOLUNTARY OR MANDATED OR MANDATORY OR ENFORCE? OR FORCED)/TI
S S8 AND (EVALUAT? OR SYSTEMATIC OR LESSON? ? OR INVESTIGAT? OR EFFECTIV? OR ASSESS? OR STUDY OR
    STUDIES OR OUTCOME? OR REVIEW? OR META()ANALY? OR METAANALY?)/TI
S S10 NOT (OCCUPATIONAL()THERAP? OR REHABILITAT? OR SOCIAL()SUPPORT OR VOCATION OR
DISABIL?)/TI,DE

MANDATORYLAST3
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S (CONTIN?(1N)EDUCAT?/TI) OR (SKILL? ?(N)DEVELOP?/TI) OR CME/TI
S (ORGANIZATIONAL(N)LEARNING)/TI OR (VOLUNTARY OR
     VOLITION?)/TI(N)(LEARNING OR TRAINING OR EDUCATION?)/TI
S (EMPLOYEE? OR WORKPLACE OR WORK FORCE OR WORKFORCE OR OFFICE? OR
     CORPORATE OR ENTERPRISE OR ORGANIZATION?)/TI(N)(TRAINING OR LEARNING
     OR TEACHING OR DEVELOPMENT)/TI
S(LEARNING(N)INTERVENTION?)/TI
S (INTERPROFESSIONAL OR INTER()PROFESSIONAL?)/TI(N)(EDUCATION? OR TRAIN? OR INSTRUCT?)/TI
S INTERPROFESSIONAL?(N)SKILL?()DEVELOP?/TI
S PROFESSION?(N)DEVELOPMENT?/TI OR DISTANCE(N)EDUCAT?/TI OR ADULT(N)LEARN?/TI OR
   INSERVICE(N)TRAIN?/TI
S PERSONNEL(N)TRAIN?/TI OR SELF/TI(N)(INSTRUCT? OR TRAIN?)/TI OR CAREER(N)DEVELOP?/TI
S INTERPROFESSIONAL?(N)DEVELOP?/TI
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S INTERPROFESSIONAL?(1N)EDUCAT?/TI
S S1 OR S2 OR S3 OR S4 OR S5 OR S7 OR S8 OR S9 OR S10
S S11 AND (REQUIRED OR VOLITION? OR VOLUNTARY OR MANDATED OR MANDATORY OR ENFORCE? OR
       FORCED)/TI
S S11 AND (EVALUATION? OR SYSTEMATIC OR MEASUR? OR INVESTIGAT? OR EFFECTIV? OR ASSESSMENT? OR
ASSESSING OR STUDY OR STUDIES OR OUTCOME? OR REVIEW? OR META()ANALY? OR METAANALY? OR COMPARISON
OR RANDOMIZED)/TI
S S13 AND PY=2000:2010
S S15 NOT (OCCUPATIONAL()THERAP? OR REHABILITAT? OR SOCIAL()SUPPORT OR VOCATION OR
DISABIL?)/TI,DE
S ANIMAL? ?/DE, GS NOT HUMAN? ?/DE, GS
S S16 NOT S17

MANDATORYFINALFINAL
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S (SKILL? ?(N)DEVELOP?/TI)
S (ORGANIZATIONAL(N)LEARNING)/TI OR (VOLUNTARY OR VOLITION?)/TI(N)(LEARNING OR TRAINING
   OR EDUCATION?)/TI
S (INTER()ORGANIZATIONAL OR ORGANIZATIONAL OR SELF()DIRECT?)/TI(2W)(EDUCATION OR TRAIN? OR
INSTRUCT? SKILL?()DEVELOP?)/TI
S (EMPLOYEE? OR WORKPLACE OR WORK()FORCE OR WORKFORCE OR OFFICE? OR CORPORATE OR ENTERPRISE OR
ORGANIZATION?)/TI(2N)(TRAINING OR LEARNING OR TEACHING OR DEVELOPMENT)/TI
S (LEARNING(N)INTERVENTION?)/TI OR LEARN?(W)PROCESS?/TI
S (INTERPROFESSIONAL OR INTER()PROFESSIONAL?)/TI(1N)(EDUCATION? OR TRAIN? OR INSTRUCT?)/TI
S INTERPROFESSIONAL?(1W)DEVELOP?/TI
S PROFESSION?(N)DEVELOPMENT?/TI OR DISTANCE(N)EDUCAT?/TI OR ADULT(N)LEARN?/TI OR
INSERVICE(N)TRAIN?/TI
S PERSONNEL(N)TRAIN?/TI OR SELF/TI(N)(INSTRUCT? OR TRAIN?)/TI OR CAREER(N)DEVELOP?/TI
S S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9
S S10 AND (REQUIRED OR VOLITION? OR COMPULSORY OR VOLUNTARY OR MANDATED OR MANDATORY OR ENFORCE?
OR FORCED)/TI
S  S10 AND (EVALUATION? OR SYSTEMATIC OR MEASUR? OR INVESTIGAT? OR EFFECTIV? OR ASSESSMENT? OR
ASSESSING OR STUDY OR STUDIES OR OUTCOME? OR REVIEW? OR META()ANALY? OR METAANALY? OR COMPARISON
OR RANDOMIZED OR CONTROLLED OR TIME()SERIES OR EVIDENCE)/TI
S S10 AND (QUALITATIVE OR QUANTITATIVE OR PRE()TEST OR POST()TEST)/TI
S S10 AND (FRAMEWORK? ? OR EVIDENCE()BASE? OR MODEL? ? OR CRITERIA)/TI
S (S11 OR S12 OR S13 OR S14) NOT (CHILDREN/TI OR SCHOOL? ?/TI OR   OCCUPATIONAL()THERAP?/TI,DE
OR REHABILITAT? /TI,DE OR SOCIAL()SUPPORT/TI,DE OR VOCATION?/TI,DE OR DISABIL?/TI,DE OR MICE/TI
OR HIV?? ?/TI OR AROUSAL/TI OR CELL? ?/TI OR ELECTROMYOSTIMULATION/TI OR MUSCLE?/DE OR
PREGNANT/TI OR POSTURE/TI OR PYRAMIDAL/TI OR
     ARTHRITIS/TI)
  16. S ANIMAL? ?/DE, GS NOT HUMAN? ?/DE, GS

MANDATORYLASTFINALPSYCHABS
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S (SKILL? ?(N)DEVELOP?/TI)
S (ORGANIZATIONAL(N)LEARNING)/TI OR (VOLUNTARY OR
    VOLITION?)/TI(N)(LEARNING OR TRAINING OR EDUCATION?)/TI
S (INTER()ORGANIZATIONAL OR ORGANIZATIONAL OR
     SELF()DIRECT?)/TI(2W)(EDUCATION OR TRAIN? OR INSTRUCT?
     SKILL?()DEVELOP?)/TI
S (EMPLOYEE? OR WORKPLACE OR WORK()FORCE OR WORKFORCE OR OFFICE? OR
    CORPORATE OR ENTERPRISE OR ORGANIZATION?)/TI(2N)(TRAINING OR LEARNING
     OR TEACHING OR DEVELOPMENT)/TI
S (LEARNING(N)INTERVENTION?)/TI OR LEARN?(W)PROCESS?/TI
S (INTERPROFESSIONAL OR INTER()PROFESSIONAL?)/TI(1N)(EDUCATION? OR TRAIN? OR INSTRUCT?)/TI
S INTERPROFESSIONAL?(1W)DEVELOP?/TI
S PROFESSION?(N)DEVELOPMENT?/TI OR DISTANCE(N)EDUCAT?/TI OR ADULT(N)LEARN?/TI OR
INSERVICE(N)TRAIN?/TI
S PERSONNEL(N)TRAIN?/TI OR SELF/TI(N)(INSTRUCT? OR TRAIN?)/TI OR CAREER(N)DEVELOP?/TI
S S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9

S  S10 AND (REQUIRED OR VOLITION? OR COMPULSORY OR VOLUNTARY OR
     MANDATED OR MANDATORY OR ENFORCE? OR FORCED)/TI
S  S10 AND (EVALUATION? OR SYSTEMATIC OR MEASUR? OR INVESTIGAT? OR
     EFFECTIV? OR ASSESSMENT? OR ASSESSING OR STUDY OR STUDIES OR OUTCOME?
     OR REVIEW? OR META()ANALY? OR METAANALY? OR COMPARISON OR RANDOMIZED
     OR CONTROLLED OR TIME()SERIES OR EVIDENCE)/TI
S S10 AND (QUALITATIVE OR QUANTITATIVE OR PRE()TEST OR POST()TEST)/TI
S S10 AND (FRAMEWORK? ? OR EVIDENCE()BASE? OR MODEL? ? OR CRITERIA)/TI
S (S11 OR S12 OR S13 OR S14) NOT (CHILDREN/TI OR SCHOOL? ?/TI OR
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    OCCUPATIONAL()THERAP?/TI,DE OR REHABILITAT? /TI,DE OR
    SOCIAL()SUPPORT/TI,DE OR VOCATION?/TI,DE OR DISABIL?/TI,DE OR MICE/TI
    OR HIV?? ?/TI OR AROUSAL/TI OR CELL? ?/TI OR ELECTROMYOSTIMULATION/TI
    OR MUSCLE?/DE OR PREGNANT/TI OR POSTURE/TI OR PYRAMIDAL/TI OR
    ARTHRITIS/TI)
S ANIMAL? ?/DE, GS NOT HUMAN? ?/DE, GS
S S19 NOT (DT=ABSTRACT COLLECTION OR DT=EDITORIAL OR DT=COMMENT? OR
    DT=LETTER OR DT=REVIEW()BOOK OR DT=ENCYCLOPEDIA?)
S S19 NOT (DT=ABSTRACT COLLECTION OR DT=EDITORIAL OR DT=COMMENT? OR
    DT=LETTER OR DT=REVIEW()BOOK OR DT=ENCYCLOPEDIA? OR DT=BOOK()SERIES OR
    DT=CHAPTER?)
S S21 NOT (PRINCIPAL? OR CHILD? OR ELEMENTARY OR HIGH()SCHOOL? OR
    MIDDLE()SCHOOL? OR UNDERGRAD? OR STUDENT? OR POST()GRAD? OR
    POSTGRAD?)/TI
S ME=CLINICAL CASE STUDY OR ME=EMPIRICAL STUDY OR ME=LITERATURE
    REVIEW OR ME=NONCLINICAL CASE STUDY OR ME=QUALITATIVE STUDY OR
    ME=QUANTITATIVE STUDY OR ME=SYSTEMATIC REVIEW
S S24 NOT TEACHER?/TI
S S25 NOT DISTANCE()EDUCAT?/TI
S S27 NOT COMMUNITY()COLLEGE?/TI
S S28 NOT CHURCH?/TI
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APPENDIX 2. Systematic reviews and primary studies included in this report

Citation	Study attributes	Results	Conclusions
Haunschild and Rhee (2004) (Primary study)	**Goals/Hypotheses:** • Do employees learn more when they choose to or when they are told to? (H1) • Is subsequent recall performance affected more by recalls initiated by the automaker, or those done by NHTSA? (H2) • Do involuntary recalls lower the subsequent recall rate? (H3) • Do different types of automakers (generalists and specialists) learn differently from involuntary and voluntary recalls? (H4) **Sources:** NHTSA data on all recalls experienced by automakers that sold passenger cars in the United States during the 1966–1999 period, modeled effects of voluntary and involuntary recalls on subsequent recall rates, based on the learning-curve tradition.	**H1:** log of cumulative production = -.232 (SE 0.121) *(p* = 0.055*);* the effect is stronger in subsequent models, especially those restricted to voluntary recalls, suggesting a reduction in subsequent errors in the form of product recalls. **H2, not H3:** • The number and rate of prior voluntary recalls, but not involuntary recalls, reduce subsequent involuntary recalls. Coefficient on cumulative voluntary recalls = −0.0911 (SE = 0.0259). Thus, an increase of 4.57 voluntary recalls (SD=1) decreased the expected involuntary recall rate by a factor of 0.66. • Prior recalls (both voluntary and involuntary) increase subsequent voluntary recalls. • There are significantly more pages in voluntary recall technical reports than involuntary ones (t =4.03, df =879, p <0.001) and voluntary recalls are more likely to be solved (X^2 = 15.138, df = 1, p < 0.001), suggesting the learning from involuntary recalls may be shallower and less likely to penetrate the organization or be stored in organizational memory. **H4:** Generalists have more voluntary recalls than specialists. Generalists learn better from voluntary recalls than specialists, where the learning target is reducing involuntary recalls.	*"We find that voluntary recalls result in more learning than mandated recalls when learning is measured as a reduction in subsequent involuntary recalls. This effect is at least partly because of shallower learning processes that result from involuntary recalls. The effect of volition, however, is different for generalist and specialist automakers. The results of this study suggest an important, yet understudied, determinant of the rate and effectiveness of learning—volition. The results also add to our knowledge of the different learning processes of generalist and specialist organizations."*
Rashman (2009) (Qualitative systematic review) Rashman (2008) (Original report)	**Goals:** to systematically review the literature on organizational learning, knowledge and capacity in public services. **Sources:** Web of Science database, key social science journals, published 1990-2005, written in English, hand searching, citation tracking, expert advice, using search criteria re OL, organizational knowledge, knowledge transfer/knowledge-share, inter-organizational learning, organizational capacity/capacity building. **Inclusion criteria:** Clearly described theory and empirical data of learning at the organizational or inter-organizational level. **Synthesis:** Qualitative	(Selected results reported, relevant to mandated learning) 131 articles included: • *"Power, control, influence and politics are important factors within the public sector in relation to organizational learning, but receive little attention in developing theory and empirical research."* • Organizational learning is an inherently political process and may be opposed or supported by different individuals. Informal politics can both support and/or undermine learning efforts. • Power and influence can be important for acceptance and embedding of knowledge, and access to resources. Power imbalances within teams can be mediated by effective team leaders and champions, which may be an important capability for development. • Formal political scrutiny can facilitate or inhibit learning. Its impact depends upon the specific characteristics of political involvement and the approach to finding solutions. Learning from failure can be particularly problematic within an overtly political context, within specific institutional settings, or risk adverse organizational cultures. • *"In contrast to private sector organizations, public service organizations'*	Recommendations for future research, relevant to mandated learning: • Develop more effective tools for measuring learning processes, learning outcomes and their impact on organizational performance. • Conduct empirical research within a social construct: improve understanding of what is learned, how it is learned and what factors lead to performance changes in a public service organization i.e., context, social factors and processes that encourage knowledge sharing, as well as of relationships between individuals and organizations that influence factors in organizational learning and knowledge. • For decision makers, the distinctions between data, information, knowledge and learning are important. Tacit and explicit knowledge are essential to understanding how knowledge is transferred. • Time, opportunities and supportive conditions are

Citation	Study attributes	Results	Conclusions
		search for knowledge may be constrained by performance targets, many of which are externally imposed." • *"There is a risk in public service organizations that an emphasis on performance standards and outcomes that rely on management information systems, may lead to an over-reliance on explicit forms of knowledge. Consequently there may be limited organizational capacity for more dynamic and emergent forms of learning that are based on social interaction and sharing of tacit knowledge across internal boundaries."* • *"The fast pace of change and the continual introduction of new initiatives (in public services), it could be argued, give little opportunity for new knowledge to be embedded and institutionalised."*	needed for the development of such learning between individuals and groups. • An important question to ask is: *"To what extent are organizational knowledge and learning interpreted in the same way across a large, multi-unit organization that is characterized by diverse professional and occupational boundaries?"*
Greenhalgh (2004) (Qualitative systematic review)	**Goal:** To review the literature on the spread and sustainability of innovations in health service delivery and organization **Sources:** 11 electronic databases, books, experts, citation mapping, hand searching of select journals in health care, health services research, organization and management, and sociological literature. No date limit. **Inclusion criteria:** Relevant topic, in English, well received by peers within a particular research tradition and adds value to the review, not a brief description or commentary. **Appraisal:** Meta-narrative mapping and narrative, qualitative appraisal to draw together, contextualize and interpret findings from various research traditions. **Grading: D**escriptive based on modified World Health Organization Health Evidence Network criteria for public health research. ***Strong direct evidence:*** Consistent findings in two or more empirical studies of appropriate design and high scientific quality undertaken in health service organizations. ***Strong indirect evidence:*** Consistent findings in two or more empirical studies of appropriate design and high scientific quality, but not from a health service	450 articles included in report. • 11 research traditions identified: rural sociology, medical sociology, communication studies, marketing and economics, development studies, health promotion, evidence-based medicine and guideline implementation, organizational studies, knowledge-based approaches to innovation in organizations, narrative organizational studies, and complexity and general systems theory. • Overview: A very small portion of empirical studies in this review either studied or acknowledged the complexities of spreading and sustaining innovation in service organizations. Most studied a few of the components, and failed to account for their different interactions, or contextual and contingent features. Findings relevant to mandatory training: • Policy directives: External mandates increase the predisposition (the motivation), but not the capacity, of an organization to adopt an innovation (**moderate direct evidence**). *"A policy "push" occurring at the early stage of implementation of an innovation initiative can increase its chances of success, perhaps most crucially by making available dedicated funding."* *"Such mandates (or the fear of them) may divert activity away from innovations as organizations second-guess what they will be required to do next, rather than focus on locally generated ideas and priorities."* • Policymaking streams: An innovation that is presented as the solution to a policymaking problem must be both technically feasible and congruent with prevailing values (**moderate indirect evidence**; **limited evidence**). It must arrive at the right stage in the local and/or national policymaking cycle (**strong direct evidence**).	• Recommendations for future research as they pertain to mandatory training: What are the harmful effects of an external "push" (such as a policy directive or incentive) for a particular innovation when the system is not ready? • What are the characteristics of more successful external pushes promoting the assimilation and implementation of innovations by health service organizations? • By what processes are particular innovations in health service delivery and organization implemented and sustained (or not) in particular contexts and settings, and can these processes be enhanced? This research would benefit from in-depth mixed-methodology studies aimed at building up a rich picture of process and impact. • A multi-method approach is essential to understanding the complexities of innovation in an organization. Experimental and quasi-experimental studies control for the context and "confounders" that are integral to diffusion, dissemination, and implementation of complex innovations. "*Research should recognize these inherent limitations and embrace a broad range of research methods emphasizing interpretive approaches."*

Citation	Study attributes	Results	Conclusions
	organization. ***Moderate direct evidence:*** *C*onsistent findings in two or more empirical studies of less appropriate design and/or of acceptable scientific quality undertaken in health service organizations. ***Moderate indirect evidence:*** *C*onsistent findings in two or more empirical studies of less appropriate design and/or of acceptable scientific quality, but not from health service organizations. ***Limited evidence:*** *O*nly one study of appropriate design and acceptable quality available, or inconsistent findings in several studies. ***No evidence.***		
Arthur (2003) (Meta-analysis)	**Goal:** To improve understanding of the relationship between design and evaluation features, and the effectiveness of training and development efforts. **Sources:** 6 cumulative reviews to identify design and evaluation features related to training effectiveness; 9 electronic databases; hand search end references, no date limit stated. **Inclusion criteria:** Empirical studies of effectiveness of organization training program or methodological approach that reported sample sizes and data allowing for calculation of effect size. Outcomes were in control of trainer or researcher. Published in English. **Appraisal:** Kirkpatrick evaluation criteria, needs assessment, training method and skill or task characteristics were coded. **Synthesis:** Meta-analysis.	397 independent data points from 162 sources to calculate sample-size weighted mean effect sizes (*d* statistic) and 95% confidence intervals: • Does the effectiveness of training vary as a function of evaluated criteria used? There are medium to large sample-weighted mean effect sizes (*d* 0.60–0.63) for organizational training effectiveness using the four Kirkpatrick evaluation criteria. For all comparisons of learning with subsequent criteria there was a decrease in effect sizes from learning to these criteria consistent with issues of transfer, lack of opportunity to perform, and skill loss. Time intervals were not related to the observed effect sizes using different evaluation criteria. • What is the relationship between needs assessment and training effectiveness? No clear patterns emerged from a small data set. • What is the observed effectiveness of specified training methods as a function of the skill or task being trained? o The effectiveness of training appears to vary as function of the specified training delivery method, the skill or task being trained, and the criterion used to operationalize effectiveness. o Overall, the magnitude of the effect sizes of a variety of individual training methods was generally favorable and ranged from medium to large effects (Sample-weighted *M, d* range 0.40 or greater). o Those with an effect size < 0.40 were computer-aided instruction alone or in combination and discussion formats. Lecture alone or in combination had medium to large effect sizes (*d* ≥ 0.40).	• The magnitude of the effectiveness of training is comparable to, and in some instances larger than, those reported for other organizational interventions. • *"The manifestation of training/learning outcomes in subsequent job behaviors (behavioral criteria) and organizational indicators (results criteria) may be a function of the favorability of the posttraining environment for the performance of the learned skills…Trained and learned skills will not be demonstrated as job-related behaviors or performance if incumbents do not have the opportunity to perform them…"* Future research is needed to: • Define the relationship between needs assessment and training effectiveness. • Identify which instructional attributes of a method impact the effectiveness of that method for different training content. • Determine the differential effectiveness of various training methods for the same content. and a single training method across a variety of skills and tasks. • Determine the effectiveness and efficacy of high-technology training methods such as Web-based training.

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